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EVALUATION OF BARK BEETLES AND ANNOSUS ROOT ROT ON THE WOLF CREEK DAM PINE PLANTATION, LAKE CUMBERLAND, KENTUCKY

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EVALUATION OF BARK BEETLES AND ANNOSUS ROOT ROT ON THE WOLF CREEK DAM PINE PLANTATION, LAKE CUMBERLAND, KENTUCKY

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ABSTRACT

A high value 240-acre pine stand at Lake Cumberland Kentucky is damaged by bark beetles and annosus root rot. Overstocking, sandy soil and soil compaction contribute to the problem. The plantation should be thinned to basal area 90 square feet per acre and stumps treated with a culture of Peniophora gigantea to prevent spread of annosus root rot. Soil compaction should be avoided or minimized.

INTRODUCTION

In response to a request by the Department of the Army, Corps of Engineers, we examined dying pines in a 240-acre plantation at Lake Cumberland, Kentucky. The area is adjacent to the Wolf Creek Dam and Fish Hatchery. The stand, composed largely of loblolly pine with a scattering of white pine and shortleaf pine is especially important from an aesthetic viewpoint. At the time of its planting (1953) this very sandy site was badly eroded.

METHODS

On May 4, 1979, the Aerial Survey Team (USDA, Forest Service, Forest Insect and Disease Management headquartered at Doraville, Georgia) aerially photographed the entire stand using color transparency film at a scale of 1:4,000. The photographs were sent to the Asheville Field Office where they were photo interpreted. Dead and dying trees were marked on the photos for ground checking to determine cause of death.

1/ Respectively, Entomologist, Supervisory Pathologist, and Biological Technicians, FI&DM, Asheville, N.C.

From May 15-18, the areas were systematically examined in the field. Where possible, causal agents were recorded for each spot and each tree. Since overstocking often contributes to tree decline conditions, the basal area (square feet of stumpage per acre) was measured at each spot using a 10-factor prism. In cases where the causal agent(s) was (were) not evident from the ground, a sampling of dead red-topped trees were cut to examine the crowns.

In addition to examining aerially-detected dead and dying trees, the whole stand was also subjectively evaluated.

RESULTS

Twenty spots consisting of red or fading trees were picked up on the photos. Sixteen of these were field examined. These spots were basically uniform in their distribution, i.e., no part of the stand had a greater concentration of spots.

Tree losses were due to a variety of causal agents - often in combination (Table 1). Most conspicuous were Ips engraver beetles (especially Ips avulsus, a species which prefers to attack the tops of trees), and annosus root rot (caused by Fomes annosus). Some of the Ips activity was associated with soil compaction - the results of some construction activity to the west and to the north of the plantation. One southern pine beetle (Dendroctonus frontalis) tree was located at the extreme southeast corner of the plantation.

Stocking of the plantation was very heavy, ranging as high as 190 square feet per acre (Table 2). The entire plantation was peppered with very old dead trees which did not show up well on the photos. Most of these trees had deteriorated to the point that determination of the direct causal agents was impossible.

DISCUSSION AND RECOMMENDATIONS

The best approach to remedying the problems at the Wolf Creek Plantation lies in a general stand improvement program.

Tree vigor throughout the entire plantation must be increased if future bark beetle outbreaks are to be avoided. This can best be accomplished by an aggressive thinning project. Basal area should be reduced to about 90 throughout the plantation. Tree selections instead of row or every other tree removed would provide the best results. Immediately upon cutting the trees, stumps should be treated with a culture of Peniophora gigantea. This fungus is an aggressive saprophyte which quickly colonizes dead stumps, thereby precluding Fomes annosus infection. Unlike the pathogen F. annosus, this fungus will not attack living trees. The dry fungus base is simply mixed with water and sprayed on the stumps.

Table 1.--Causal agents found in examining sixteen aerially detected areas of dead timber - Lake Cumberland, Kentucky.[1/]

	No. Spots Affected	Percent of Spots Affected
Ips bark beetles	14	87.5
Annosus root rot	5	31.3
Compaction	2	12.5
Spider mites	2	12.5
Black turpentine beetle	1	6.2
Southern pine beetle	1	6.2

1/ Some spots were affected by more than one causal agent.

Table 2.--General stand data for sixteen aerially-detected areas of dead timber - Lake Cumberland, Kentucky.

	$\bar{X}$	Range
Basal Area (ft/A)	125	30-190
Tree height (ft)	63.3	50-81
Tree diameter (inches)	8.1	5.7-22.7
Trees in infection (infestation) center	8.7	1-23
Trees currently infested by bark beetles	1.8	1-5

In thinning the plantation, care should be taken not to damage the residual stand as this can predispose damaged trees to both bark beetle and root rot attack. Slash from the thinning operation should be scattered to encourage rapid dessication which eliminates it as a potential food base for Ips beetles. Because bark beetle activity is characteristically high during dry conditions, these control measures should not be undertaken during drought.

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